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Committee on the Peaceful Uses of Outer Space

Implementation of an integrated, space-based global natural disaster management system

Report of the Secretariat

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I. Introduction

1. At its forty-third session, the Committee on the Peaceful Uses of Outer Space agreed that, in accordance with the first year of the three-year work plan entitled "Implementation of an integrated, space-based global natural disaster management system", the Scientific and Technical Subcommittee at its thirty-eighth session should review the types of natural disasters being faced and the extent of the application of space-based services being utilized for their mitigation.[1]

2. The Committee requested the Office for Outer Space Affairs of the Secretariat to prepare for the work plan the present document,[2] which contains information on some of the major disaster reduction strategies and systems worldwide, including efforts within the United Nations system and in the Committee on Earth Observation Satellites (CEOS) and the Global Disaster Information Network.

3. Information submitted by Member States and international organizations on the implementation of an integrated, space-based global natural disaster management system is contained in a separate document (A/AC.105/753).

II. Information relevant to the use of space technology in disaster management

4. Disaster management includes the following elements: (a) disaster mitigation, which involves hazard mapping, risk assessment and presentation of information for the elaboration of land-use legislation; (b) disaster preparedness, which involves forecasts and early warning; (c) disaster relief, which includes action taken to mitigate the effects of a disaster after it occurs; and (d) disaster rehabilitation after the disaster.

5. Space technologies can play important roles in early warning and management of the effects of disasters; however, an operational disaster management support service that uses the capabilities of space systems can only be achieved through the joint use of satellite communications and remote sensing images, including services and other products of space systems, with other non-space sources providing ground information. For this purpose, it is necessary to promote adequate coordination between the technical and research organizations in charge of evaluating risk and organizations responsible for attending to emergencies once a disaster has taken place, and satellite operators and diverse value-adding institutions.

6. Earth observation satellites provide an important and unique source of information on issues of social and economic importance in such areas as disaster management. Emerging new services through the satellite communications provide more efficient solutions for improving the effectiveness of disaster warning and relief operations and for developing reduction strategies. Meteorological and Earth observation satellites provide the data for weather forecasts. The warning that they provide on hurricanes and cyclones has dramatically reduced material and human losses in many countries that are prone to such disasters. Satellite positioning systems, such as the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS) now provide non-encrypted signals, free of charge, which are increasingly being used to prevent or combat various types of disaster.

7. As a consequence of the large number of potential and demonstrated uses of space technology in disaster management and humanitarian affairs, the number of actors that should be involved in considering an integrated space-based disaster management system is also large. In the section that follows a United Nations framework for disaster reduction and emergency response is presented and information and references are provided on significant ongoing space-related efforts that rely on international cooperation.

A. United Nations framework for disaster reduction and emergency response

1. International Strategy for Disaster Reduction

8. Analysis of the trend in major natural disasters occurring between 1950 and 1999 reveals substantial growth in the occurrence of such disasters, particularly during the past decade. In 1999 alone, there were more than 700 large-scale disasters, with losses totalling in excess of 100 billion United States dollars. The International Strategy for Disaster Reduction recognizes the growing danger posed by this situation and the need to treat disaster reduction as a central issue on the international agenda.

9. It was this recognition that led in part to the launch of the International Decade for Natural Disaster Reduction for the period 1990-1999. The various initiatives promoted during the Decade served to increase awareness of the importance of disasters, whether natural or technological. Many organizations and numerous countries made joint efforts during the Decade to bring the issue of disaster reduction to the forefront of international debate.

10. Although the occurrence of many natural phenomena are referred to as natural disasters, human behaviour is the major cause of people's increasing vulnerability to natural hazards. Climate change, deforestation and shifting demographic trends are evidence of the role of the human factor in creating a predisposition to the increased severity and frequency of disasters. In other words, human activities contribute to growing vulnerability, increasing the risk that natural phenomena turn into actual disasters.

11. This recognition has led to a significant conceptual shift from the traditional preoccupation with disaster response to a new culture of disaster reduction, which is reflected in the International Strategy for Disaster Reduction. The new vision is to move beyond the protection against hazards to the management of risk. The Strategy is a proactive mechanism aimed at reducing the impact of natural and other hazards on society and the economy.

12. The adoption of this new vision by the Member States has brought about a new thrust to elicit action and financial and political commitment from national Governments and international organizations, making the Strategy a global endeavour.

13. The International Strategy for Disaster Reduction is a global strategy with two institutional arms. The first arm is the Inter-Agency Task Force for Disaster Reduction, introducing a strong call for inter-agency cooperation and coordination.

14. In its resolution 1999/63 of 30 July 1999, the Economic and Social Council requested the Secretary-General to establish an inter-agency task force to serve as the main forum within the United Nations for continued and concerted emphasis on natural disaster reduction. In its resolution 54/219 of 22 December 1999, the General Assembly endorsed the proposal of the Secretary-General to establish the inter-agency task force (A/54/497, paras. 11-14). The Task Force has the following main functions (A/54/497, para. 15): (a) to serve as the main forum within the United Nations system for devising strategies and policies for the reduction of natural hazards; (b) to identify gaps in disaster reduction policies and programmes and recommend remedial action; (c) to ensure complementarity of action by agencies involved in disaster reduction; (d) to provide policy guidance to the secretariat of the International Strategy for Disaster Reduction; and (e) to convene ad hoc meetings of experts on issues related to disaster reduction.

15. The Task Force is chaired by the Under-Secretary-General for Humanitarian Affairs and is composed of the Chairperson and the Secretary (the Director of the secretariat for the International Strategy for Disaster Reduction, ex officio); eight representatives of organizations and other entities of the United Nations system (the United Nations Environment Programme, the United Nations Development Programme, the World Food Programme, the Food and Agriculture Organization of the United Nations, the United Nations Educational, Scientific and Cultural Organization, the World Bank, the International Telecommunication Union and the World Meteorological Organization); six representatives from regional entities (the Council of Europe, the Asian Disaster Preparedness Center, the Organization of African Unity, the Organization of American States, the South Pacific Applied Geoscience Commission and the CIS Interstate Council for Emergency Situations); and eight representatives of civil society and non-governmental organizations.

16. The work of the Task Force is also being followed by a number of States that have requested to attend the Task Force meetings as observers. The Task Force is not an intergovernmental body but a committee of high-level members with an active interest in disaster reduction matters who collectively are called upon to devise strategies and methodologies for the implementation of the International Strategy for Disaster Reduction.

17. The second arm of the International Strategy for Disaster Reduction is the secretariat of the Task Force, which is based in Geneva. It serves as the focal point within the United Nations for strategies and programmes for natural disaster reduction. The secretariat is a multidisciplinary team that supports the Task Force, in which international policy can be made. It is the institutional platform from which programmes can be launched. It does not implement programmes but enables others to implement programmes more effectively.

2. Coordination of humanitarian emergency response

18. The Office for the Coordination of Humanitarian Affairs of the Secretariat was established pursuant to the adoption of the Secretary-General's programme for reform. In accordance with the provisions of General Assembly resolution 46/182 of 19 December 1991, the functions of the Emergency Relief Coordinator are focused in three core areas: (a) policy development and coordination functions in support of the Secretary-General, ensuring that all humanitarian issues, including those which fall in gaps between existing mandates of agencies such as protection and assistance

for internally displaced persons, are addressed; (b) advocacy of humanitarian issues with political organs, notably the Security Council; and (c) coordination of humanitarian emergency response, by ensuring that an appropriate response mechanism is established, through Inter-Agency Standing Committee (IASC) consultations, on the ground.

19. The Office for the Coordination of Humanitarian Affairs discharges its coordination function primarily through IASC, which is chaired by the Emergency Relief Coordinator, with the participation of all humanitarian partners, including the International Red Cross and Red Crescent Movement and non-governmental organizations. IASC ensures inter-agency decision-making in response to complex emergencies, including needs assessments, consolidated appeals, field coordination arrangements and the development of humanitarian policies.

20. If required, in consultation with the United Nations Resident Coordinator, the Office for the Coordination of Humanitarian Affairs may send a United Nations Disaster Assessment and Coordination (UNDAC) team to assist in emergency assessment and field coordination during the initial relief phase. The UNDAC team consists of qualified and specially trained national emergency management experts, as well as staff from the Office for the Coordination of Humanitarian Affairs, who are on permanent standby. Team members, accompanied by a communications expert and/or with mobile satellite telecommunications equipment, as required, can leave within hours.

B. Activities within the United Nations system in support of disaster management

1. Inter-Agency Meeting on Outer Space Activities

21. In its resolution 54/68 of 6 December 1999, the General Assembly endorsed the resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development";[3] urged, inter alia, organizations within the United Nations system to take the necessary action for the effective implementation of the Vienna Declaration; and requested all relevant organizations of the United Nations system to review and, where necessary, adjust their programmes and activities in line with the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) and to take appropriate measures to ensure their full and effective implementation, in particular by further enhancing the coordination of their space-related activities through the Inter-Agency Meeting on Outer Space Activities.

22. The Inter-Agency Meeting meets annually and provides a forum for the participating organizations of the United Nations system to exchange information and views on the current and future plans of space-related activities of common interest and promote synergy among the agencies in the United Nations system. The Office for Outer Space Affairs serves as its secretariat.

23. At its eighteenth session, in 1998, the Inter-Agency Meeting on Outer Space Activities agreed to consider the possibility of re-categorizing space-related activities to better reflect, in the annual report of the Secretary-General on the coordination of outer space activities within the United Nations system, the priority

areas of application being identified by Member States. At its twentieth session, in 2000, the Inter-Agency Meeting agreed upon the revised structure as contained in its report on that session (A/AC.105/727, annex I).

24. The report of the Inter-Agency Meeting on its twenty-first session (A/AC.105/757) will contain a section entitled "Using space applications for human security, development and welfare" with two subsections: (a) enhancing capabilities for disaster reduction; and (b) enhancing economic, social and cultural security. Current and future plans of space-related activities conducted by the agencies in the United Nations system in support of disaster management will be reflected in that section.

2. Office for Outer Space Affairs

25. In its resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development", UNISPACE III called for action to be taken to implement an integrated, global system, especially through international cooperation, to manage natural disaster mitigation, relief and prevention efforts, especially of an international nature, through Earth observation, communications and other space-based services, making maximum use of existing capabilities and filling gaps in worldwide satellite coverage.[4]

26. In response to that call, under the Programme on Space Applications, the Office for Outer Space Affairs has organized a series of workshops on the use of space technology in support of disaster management. The objectives of the workshops are:

(a) To increase the awareness of managers and decision makers involved in disaster management of the potential benefits and the cost-effectiveness of using space technologies;

(b) To determine the types of information and communications needed in managing specific disasters and the extent to which they could be met by space technologies;

(c) To develop a blueprint of action that could lead in the near future to one or more pilot projects incorporating and testing the use of space tools in disaster management.

27. It is expected that, as a result of the workshops, action will be taken in the short term that could lead to the launching of one or more pilot projects in which interested national institutions responsible for disaster management could incorporate and test the use of space technologies. The pilot projects would be designed and carried out through international cooperation and would be aimed at producing synergy among initiatives being carried out in that area by various institutions or groups of institutions.

28. The first in the series of workshops, the United Nations/Chile/European Space Agency Workshop on the Use of Space Technology in Disaster Management, was held in La Serena, Chile, from 13 to 17 November 2000, for the benefit of countries in Latin America and the Caribbean. The Workshop was co-sponsored by the Government of Chile and the European Space Agency (ESA). The report of the Workshop, including the results achieved and the plan for follow-up action, will be

presented in document A/AC.105/747. Similar workshops are being planned for Africa, Asia and the Pacific, and eastern Europe.

3. Secretariat for the International Strategy Disaster Reduction

29. Following a recent meeting of the Inter-Agency Task Force for Disaster Reduction, the secretariat of the International Strategy for Disaster Reduction is formulating a plan of action based on a number of strategic initiatives to be undertaken at the global, regional, subregional and national levels, including the provision of support to the national platforms for the Strategy. The initiatives are designed to complement, and not to duplicate, the work of the various international organizations active in disaster reduction. Accordingly, the secretariat of the Strategy participates in the work of the Disaster Management Support Group of CEOS, and the Inter-Agency Meeting on Outer Space Activities and collaborates closely with the Office for Outer Space Affairs. Information on the work of the secretariat can be found on the Internet (http://www.unisdr.org).

30. The secretariat of the International Strategy for Disaster Reduction has placed increased emphasis on satellite applications in recognition of the significant impact that such innovative solutions can have in terms of risk management for vulnerable communities in both developed and developing countries. The secretariat participated in the United Nations/Chile/European Space Agency Workshop on the Use of Space Technology in Disaster Management, held in La Serena, Chile, in November 2000.

4. Office for the Coordination of Humanitarian Affairs

31. The Office for the Coordination of Humanitarian Affairs, through its Disaster Response Branch in Geneva, has established an emergency response system for coordinating action taken by the international community as a result of natural disasters and environmental emergencies, including technological accidents.

32. The Disaster Response Branch is the focal point within the Office for the Coordination of Humanitarian Affairs for mobilizing and coordinating international disaster response and can be contacted on a 24-hour basis in case of emergency. The operations centre of the Disaster Response Branch is specially designed and equipped for the mobilization and coordination of international emergency operations in response to disasters.

33. States can address requests for information and/or international assistance in cases of natural disasters or environmental emergencies directly to the Disaster Response Branch, or through the United Nations Resident Coordinator in the affected country. Relief Web (www.reliefweb.int), managed by the Office for the Coordination of Humanitarian Affairs, provides up-to-date information on complex emergencies and natural disasters collected from over 170 sources.

5. "First on the Ground" initiative

34. In his report entitled "'We the Peoples': the Role of the United Nations in the 21st Century" (A/54/2000), the Secretary-General announced a new United Nations disaster response initiative, entitled "First on the Ground", which will provide mobile and satellite telephones, as well as microwave links, for humanitarian relief workers in areas affected by natural disasters and emergencies. The initiative will be

led by the communications company Ericsson, with United Nations partners and the International Federation of Red Cross and Red Crescent Societies. A recently launched pilot project for the initiative will provide a benchmark for developing a communications response that addresses the varying levels of preparedness of different countries. The following countries that are prone to disasters due to their geographical location or economic situation have been chosen for the pilot project: Costa Rica, Guatemala, the Islamic Republic of Iran, Thailand, Turkey and Viet Nam. The pilot project will help to determine the current level of preparedness of those countries, what resources exist and what those countries would need to begin to build common preparedness plans and communication response plans for disasters.

C. Disaster Management Support Group of the Committee on Earth Observation Satellites

35. At its forty-third session, the Committee on the Peaceful Uses of Outer Space agreed that CEOS should be invited to make a presentation at the thirty-eighth session of the Scientific and Technical Subcommittee on an integrated, space-based global natural disaster management system, in connection with the first year of its work plan. By extending the invitation, the Committee recognized the important contributions being made by CEOS on the subject. The membership of CEOS includes Earth observation satellite operators and users of satellite data. A significant number of entities of the United Nations system, including the Office for Outer Space Affairs, are associate members of CEOS.

36. Weather satellites have long been used to support forecasting of intense weather hazards such as tropical cyclones, severe storms and flash floods. Although there have been numerous research and operational demonstrations that illustrate the potential usefulness of Earth observation satellite data for a broader range of hazards, the operational application of those data to other hazards is rare. Recognizing the benefits that could be gained from better application of Earth observation satellite data to natural and technological hazards, CEOS initiated in 1997 the Disaster Management Support Project. The Project published two annual reports. Since the last report was published, the Project has become an ad hoc working group of CEOS.

37. The ad hoc Disaster Management Support Group supports natural and technological disaster management on a worldwide basis by fostering improved utilization of existing and planned Earth observation satellite data. The Group serves as a forum for identifying and interacting with current and potential users of space-derived data as one of the tools to deal with disasters.

38. The Disaster Management Support Group focuses on developing and refining recommendations for the application of satellite data to selected hazard areas. Hazard teams for the selected areas have been formed to document findings, recommendations and specific user requirements. The Group addresses policy and technical issues, focusing on comparing user requirements with the capacity of satellite images to meet those requirements, and recommends steps to correct any mismatches between the two.

39. Meetings of the Disaster Management Support Group have been held 2-3 times per year. With over 300 participants from more than 140 organizations, the Group has found strong support among CEOS members and associates, as well as an enthusiastic reception from numerous international, regional and national emergency managers, and distinct interest among members of the commercial sector.

40. The Disaster Management Support Group currently has eight hazard teams whose members include representatives from satellite agencies and emergency management users' organizations. There are hazard teams for drought, earthquake, fire, flood, ice, landslide, oil spill, and volcanic hazards. Teams are charged with compiling user requirements, identifying shortcomings and gaps in the provision of required satellite data and developing recommendations for alleviating them. Particular emphasis is placed on working closely with space agencies, international and regional organizations and commercial organizations on the implementation of the recommendations.

41. Following its formation, the Disaster Management Support Group held a planning meeting in Tokyo in February 2000. At that meeting, hosted by the National Space Development Agency (NASDA) of Japan, the Group focused on plans for demonstrating coordinated space agency responses to specific disasters by using guidelines to be drafted by ESA and the Centre national d'études spatiales (CNES) of France. Representatives from two regional institutions, the Asia-Pacific Advanced Network and the Asian Disaster Reduction Center, explained their roles in facilitating access to and better utilization of Earth observation satellite data products to local end-users for disaster management in Asia and the Pacific.

42. At its second meeting, hosted by the Canada Centre for Remote Sensing in Ottawa in June 2000, the Disaster Management Support Group welcomed participation by representatives from the remote sensing industry: Spot Image, RADARSAT International, Orbimage and Space Imaging. Those representatives described examples of disaster support that could be provided by private satellite operators. Participants explored ways to cooperate on providing better information to those who need to obtain remotely sensed data. Presentations were also made on the International Strategy for Disaster Reduction, the Global Disaster Information Network and the work of the Committee on the Peaceful Uses of Outer Space. ESA and CNES provided initial guidelines for demonstrating coordinated space agency responses to requests for satellite remote sensing data and imagery. Those guidelines were based on the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, signed by ESA and CNES on 22 June 2000. Since then, the Canadian Space Agency has also signed the Charter.

43. In general, timely information on the development of hazards, as well as general information on risks, hazards and opportunities, remains fragmented and difficult to locate. To address these and other problems, prototype tools are being developed. The National Oceanographic and Atmospheric Administration (NOAA) of the United States of America is sponsoring a prototype information server to demonstrate timely access to satellite-derived data and information products to support various facets of disaster management. A number of agencies are participating in the development of the server, providing links to their data and information. An information tool team oversees the development of the server.

44. The information tool team is currently developing two tools. One is a "hot events" page of links to web sites with data and products for recent significant hazard events. The other is a "contacts" page to direct potential users to providers of data and products that can support disaster management.

45. The Disaster Management Support Group has developed a number of findings and recommendations. There are currently 12 overarching recommendations derived from nine findings. According to the findings, that disaster managers often recognize the value of and are willing to use new satellite technology but may be reluctant to do so because the technology is unfamiliar and unproven in an operational environment. The recommendations suggest ways that the space community might respond (for example, by promoting mutual dialogue, creating user-friendly tools, performing compelling demonstrations and using integrated approaches to create more user-friendly products and services). The full set of findings and overarching recommendations and hazard-specific team recommendations can be found in the report of the Disaster Management Support Group to CEOS for the year 2000. Hazard team reports and the information tool team report are also available via the information server of the Disaster Management Support Group on the Internet (http://disaster.ceos.org) and in hard copy.

46. The work plan of the Disaster Management Support Group calls for hazard teams and the information tool team to continue their respective activities, as well as to address new elements. These include fostering more intense cooperation among space agencies, with the commercial sector and with international disaster organizations. The Disaster Management Support Group is working with the CEOS Working Group on Information Systems and Services to find ways that the Group can leverage tools and capabilities developed by the Working Group.

47. One aspect of the work plan of the Disaster Management Support Group is to demonstrate how the efforts of space agencies to respond to specific disasters might be coordinated. Under the guidelines provided by the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, space agencies could conduct multi-mission tasking of existing satellites on a "best effort" basis, as demonstrations of joint support for specific disasters. Each hazard team is considering projects that will demonstrate coordination of space agency assets. Demonstration activities to be pursued by the Disaster Management Support Group imply no formal commitment to the Charter by agencies that are willing to participate in a demonstration. Nevertheless, it is expected that several more space agencies will join the Charter.

48. The work plan of the Disaster Management Support Group calls for a closer relationship with the commercial sector by continuing to identify barriers to improving the use of satellite data for disaster management and to identify potential areas for collaboration to mitigate such barriers.

49. The Disaster Management Support Group is also working closely with key United Nations institutions and bodies such as the secretariat for the International Strategy for Disaster Reduction, the Office for Outer Space Affairs and the Committee on Peaceful Use of Outer Space, that have roles in coordinating aspects of disaster management.

50. The work plan of the Disaster Management Support Group also envisions greater coordination with other CEOS working groups. The Working Group on Information Systems and Services has developed several information tools that can eventually be useful for activities of the Disaster Management Support Group and is currently supporting the information tool team in developing a contacts list for providers of data and products that can support disaster management. It is anticipated that the Disaster Management Support Group will also coordinate with the CEOS ad hoc working group on education, which is co-chaired by the Indian Space Research Organization and the Office for Outer Space Affairs, in building the capacity of the disaster management community.

D. Global Disaster Information Network

51. In its resolution 54/233 of 22 December 1999, the General Assembly recalled the consideration of natural disasters contained in the report of UNISPACE III and encouraged further use of space-based technologies for the prevention, mitigation and management of natural disasters, noting in that regard, the establishment of the Global Disaster Information Network.

52. The Global Disaster Information Network is a voluntary, independent, self-sustaining, non-profit association of nations, organizations and professionals from all sectors of society with an interest in sharing disaster information. Its aim is to make better use of existing and new technologies and negotiate institutional processes to promote global sharing of disaster information between providers and users. The Network represents an attempt to improve the effectiveness and interoperability of natural and technological disaster information systems. It does this, in part, by providing a primary portal of access and linkage to existing national and international emergency and disaster management networks. The Network fosters better early warning and mitigation and a more informed general public.

53. The Global Disaster Information Network is global in scope. It facilitates the exchange of thematic and organizational content (data, information and knowledge), focusing on natural and technological disasters. That does not exclude other types of disasters or emergency situations in the context of which exchanges facilitated by the Network are feasible or appropriate. The Network processes information about all disaster management functions: prevention, mitigation, planning, preparedness, monitoring, warning, response, rehabilitation, reconstruction and recovery. The range of disaster information reflects what is made available by information providers; the Network is not a substantial provider, nor does it limit what is made available.

54. Participants in the Global Disaster Information Network include countries, international organizations, national, regional and local disaster management agencies, disaster relief organizations, non-governmental organizations, academic

institutions, private industry and recognized experts. Additional information is available on the web site of the Network (http://www.gdin-international.org/).

Notes

[1] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 119.

[2] Ibid., para. 117.

[3] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

[4] Ibid., chap. I, resolution 1, para. 1 (b) (ii).